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Europäisches Patentamt
European Patent Office
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(11)

EP 0 754 437 A3

(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
19.03.1997 Bulletin 1997/12

(51) Int Cl.⁶: **A61B 17/39**

(43) Date of publication A2:
22.01.1997 Bulletin 1997/04

(21) Application number: **96304558.8**(22) Date of filing: **19.06.1996**

(84) Designated Contracting States:
BE CH DE DK ES FR GB IE IT LI NL SE

(30) Priority: 23.06.1995 GB 9512888
23.06.1995 GB 9512889
29.12.1995 GB 9526627
06.03.1996 GB 9604770

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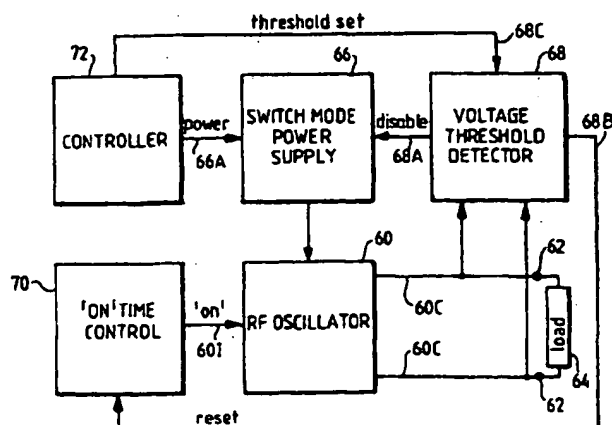
(54) An electrosurgical generator and system

(57) An electrosurgical system including an electrode assembly having two electrodes for use immersed in an electrically conductive fluid has a generator with control circuitry for rapidly reducing the delivered radio frequency output power by at least 50% within approximately 100µs, corresponding to the time needed for a few cycles of the peak radio frequency output voltage to reach a pre determined threshold limit. In this way, tissue coagulation can be performed in, for example, saline without significant steam generation.

The same peak voltage limitation technique is used

in a tissue vaporization or cutting mode to limit the size of the steam pocket at the electrodes and to avoid electrode burning.

The output power reduction is obtained by "on time control" (70) by producing a signal synchronous with the RF oscillator, thereby reducing progressively the "conduction state" of the gate (80) which connects the power supply with the oscillator. Switch mode power supply (66) can itself vary its output voltage as a function of signal (66) from the controller (72), the speed of variation however will be much slower than the one produced by "ON" time control mechanism.

**FIG.5.****EP 0 754 437 A3**



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EUROPEAN SEARCH REPORT

Application Number
EP 96 30 4558

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 316 469 A (ERBE) * column 7, line 40-43 * * column 8, line 27-32 * * figure 1 *	1	A61B17/39
A	US 4 727 874 A (BOWERS) * figure 1 * * column 4, line 37-43 * * column 5, line 53-56 *	1	
A	DE 31 19 735 A (DELMA) * abstract *	1	
A	US 4 617 927 A (MANES) * abstract *	7,11	
A	US 5 108 391 A (FLACHENECKER) * the whole document *	11,13	
A	GB 2 133 290 A (LOMBARDI) * abstract *	23	
A	GB 2 164 473 A (C R BARD) * abstract; figure 1 *	23	
A	US 4 114 623 A (MEINKE) * the whole document *		
A	DE 41 26 608 A (FASTENMEIER) * abstract *		
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 January 1997	Examiner Papone, F
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons @ : member of the same patent family, corresponding document</p>			

EPO FORM 1503 (01.92) (P04/C01)



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CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- ☐ All claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claims:
- ☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions or groups of inventions.

namely:

see sheet -B-

- ☒ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- ☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respects of which search fees have been paid, namely claims:
- ☐ None of the further search fees has been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims

**LACK OF UNITY OF INVENTION**

The Search Division considers that the present European patent application does not comply with the requirement of unity of invention and relates to several inventions, namely:

1. Claims 1-4:
Generator sensing peak output voltage, with switching device to reduce power
2. Claims 5-6,17-22:
Generator sensing impedance and reducing duty cycle
3. Claims 7-10:
Generator sensing peak output voltage to reduce conduction time
4. Claims 11-12,13-16:
Generator having two levels of output peak or output voltage as a function of two operational modes
5. Claims 23-41:
Generator having reduction of power independently or in addition to supply voltage reduction